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RANGE AND LIVESTOCK MANAGEMENT IN THE SHORTGRASS PRAIRIE REGION OF SOUTHERN ALBERTA AND SASKATCHEWAN

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COMMON AND BOTANICAL NAMES OF PLANTS MENTIONED

Blue grama grass	Bouteloua gracilis
Bluejoint (Western wheat grass)	Agropyron Smithii
Crested wheat grass	Agropyron cristatum
Death camas	Zygadenus gramineus
Greasewood	Sarcobatus vermiculatus
Junegrass	Koeleria cristata
Niggerwool	Carex filifolia
Pasture sage	Artemisia frigida
Prickly pear cactus	Opuntia polyacantha
Russian wild rye	Elymus junceus
Sagebrush	Artemisia cana
Salt sage	Atriplex Nuttallii
Sandberg's bluegrass	Poa secunda
Sandgrass	Calamovilfa longifolia
Speargrass	Stipa comata
Winterfat	Eurotia lanata

RANGE AND LIVESTOCK MANAGEMENT ON THE SHORTGRASS CANADIAN PRAIRIE

S. Smoliak and H. F. Peters[1]

The shortgrass prairie extends eastward from south central Alberta to the Wood Mountains in Saskatchewan and northward some 200 miles from the International Boundary. The climate of the area is characterized by low rainfall, high summer temperatures, and high evaporation rates. The upland soils are typically loam with shallow eroded pits, known as blowouts, exposing a layer of impervious hardpan. This generally lies about 12 inches below the surface and marks the lowest depth of moisture penetration. These factors limit vegetative growth and preclude the efficient production of cereal crops, except in the most favourable seasons. The native grasses, while not tall growing, are palatable and nutritious, and, during the period of plant growth, livestock feeding on them make rapid and economical gains. Production of cattle and sheep are primary enterprises throughout the area. Efficient utilization and continuity of supply of the grass, the main resource, is of prime importance to the permanence of a grazing enterprise and the profits to be realized therefrom.

NUTRITIVE VALUE OF RANGE FORAGE

The grasses change in chemical composition with growth development. During the season of rapid growth the protein level is 15 to 20 per cent and phosphorus approximately 0·25 per cent. Protein is needed for growth of animals and for milk and wool production. Phosphorus, the mineral most apt to be deficient, is needed for bone development and general health of animals. There is a progressive decline in the content of these two nutrients until in October the cured grasses contain approximately 5 per cent protein

FIG. 1—Romnelet ewes on winter range. Note clumps of sagebrush. Sheep make more use of browse plants than cattle do, although these species are used to some extent by both sheep and cattle during the winter.

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and 0·08 per cent phosphorus. The broad-leaved species of plants are, in general, higher in protein and phosphorus content than the grasses at comparable stages. The most important of these, winterfat and salt sage, contain 10 to 11 per cent protein and 0·10 per cent phosphorus after they are cured in October. Thus they are of great value on winter range. Less palatable broad-leaved species, which are also used to some extent for winter grazing and contain more protein and phosphorus than the cured grasses, are pasture sage and sagebrush. Sagebrush is particularly high in phosphorus, containing 0·45 per cent of this mineral in the leaf stage and 0·22 per cent after curing. Greasewood, a shrub found on saline (salty) soils, contains close to 20 per cent protein in the flowering stage but is also eaten less readily than are the winterfat and salt sage. There have been instances of sheep poisoning due to excessive consumption of greasewood.

The grasses produce the bulk of the forage and the supply of protein and phosphorus available to grazing livestock therefore will be reduced during the fall, winter, and early spring months. Studies with cattle have borne this out. Cattle make their most rapid gains when the grass is green and daily gains diminish as the season progresses. Cattle often lose weight in late September or October because of early storms and range operators have found it profitable to market sale cattle in early September to avoid these losses.

PRODUCTIVITY AND CARRYING POWER OF NATIVE RANGELAND

Shortgrass prairie will yield an average of 265 pounds dry forage per acre annually, 45 per cent of which must be left as carryover to maintain the range in a productive condition. In terms of livestock production, the feed available for use represents an output of 10 to 12 pounds of beef per acre yearly. Grazing studies with livestock have shown that a 1,000-pound cow requires 4·7 acres per month of grazing, or approximately 35 acres for the period April 1 to November 15. An additional 15 acres for winter grazing are required, making the year-round carrying capacity 50 acres per cow. In determining carrying capacity of the range for sheep, five sheep are considered equivalent to one cow.

The principal forage-producing species of shortgrass prairie, in order of decreasing yield, are speargrass, bluejoint, blue grama grass, Junegrass, winterfat, Sandberg's bluegrass, niggerwool, and salt sage. These plants are all palatable to livestock.

The mixed-grass prairie, which lies adjacent to the shortgrass prairie, is a zone of slightly higher rainfall and lower temperature and evaporation rate. The vegetative cover in that area consists of both short and medium tall grasses and the carrying power is somewhat higher, 2·8 acres per cow-month. These two grassland types are sometimes classed together as shortgrass prairie but it is important to recognize the existing zonal differences in soil type, moisture supply, and productivity of the grasses.

RECOGNITION OF OVERGRAZING

Effects on grazing animals

Reduced summer gains of market cattle, lighter weaning weights of calves, increased death losses and high winter feed costs are the immediate consequences of overgrazing rangeland. In carrying-capacity experiments at Manyberries average fall weights of 6-year-old cows and their weaned calves were 983 and 363 pounds, respectively, on over-grazed range (20 acres per head during the 7-month grazing period), and 1,177 and 418 pounds, respectively, on range grazed lightly (40 acres per head).

Effects on the grass cover

The effects of overgrazing on the grass cover, while not so immediate, were nonetheless significant. Speargrass and Junegrass declined the most in density and productivity, followed by blue grama grass and bluejoint. Sandberg's bluegrass, a grass of comparatively low forage value, increased in density, as did the pasture sage and prickly pear cactus. On sheep ranges great care is needed to prevent the development of these symptoms of range deterioration, especially in the spring during the lambing season. In interpreting the abundance of unpalatable species as indicators of overgrazing it is necessary to separate differences in their density caused by moisture conditions. Thus pasture sage decreased in density during the dry years at a greater extent than did the grasses at all levels of grazing, but its decrease was least in the pasture grazed most heavily. During years of more favourable moisture supply, pasture sage increased rapidly in density on the heavily grazed pastures, whereas the palatable forage yield decreased significantly at this time. Pasture sage continued to decrease in density on the lightly grazed pasture during years of favourable moisture conditions. Where pasture sage and sagebrush are eaten to any great extent by cattle during the summer there is good indication that the pasture is being overgrazed. However, in evaluating the condition of native rangeland the vigour and degree of utilization of all species and the gains of the grazing animals should be taken into consideration. Many experienced ranchers have learned through observation to gauge the condition of their range with a good degree of accuracy.

DROUGHT

Effects of drought

Recurrent periods of drought cause great variations in forage production on shortgrass range. Thus it took 70 acres in 1936 to provide the same amount of feed as was produced on 12 acres in 1942. Seasonal rainfall (April to July inclusive) was 2·63 inches in 1936, the driest year of the period 1929 to 1951, and 11·46 inches in 1942, the year with highest seasonal rainfall. Average seasonal and annual precipitation at the Manyberries Station during the 23-year period were 5·85 inches and 11·52 inches, respectively, and evaporation (May to September) averaged 31·02 inches for the period.

During a series of dry years, both grasses and the forbs (broad-leaved species) become weakened in growth. If overgrazing has been practised at the same time, the effects will be intensified, and the useful native forage may be replaced by weeds of low forage value. In cases of severe depletion, reseeding of the range may be the only recourse.

Combating effects of drought

When conservative grazing is practised there is little danger of a rancher being forced to liquidate his breeding herd during the drier years. Use of supplemental feeds on dry ranges and the wintering over of steers for summering on grass will help to avoid this difficulty. Steers and dry cows can be marketed early in the event of an abnormally dry period. In years of heavy snowfall, use of the snowplough to bare off grassed flats and make native forage available to livestock is an economical practice. The operator who aims to keep 2 to 3 years' feed requirements in reserve will be in a good position to maintain his herd in time of drought and severe winters.

RANGE USE OF PROTEIN SUPPLEMENTS

Wintering beef cows

Experienced operators know that cattle that are in good condition in the fall winter best. However, it is essential to recognize the point during a winter beyond which a cow can no longer be expected to survive and produce a thrifty calf without some supplemental feed. Protein supplements in pellet or nutted form have been used successfully as emergency feeds for cows wintering on the range. An allowance of 1 to 1½ pounds daily of linseed oilcake (37 per cent protein), or its equivalent, is sufficient for a cow. Heifers under 3 years of age will require more feed and care than mature cows under adverse conditions of winter. Most range cows are not able to withstand severe winter conditions after 8 or 9 years of age unless extra feed and care are given.

Wintering range calves

Range calves will rustle out if a field of good grass with shelter and water is available. Under these conditions 1 pound of high-protein supplement per day should be fed from the time of weaning, in early November, to April. This enables calves to enter the winter in thrifty condition and helps to maintain

FIG. 2—Forage on well-grassed winter range can be made available to livestock through the use of a homemade V-type snowplough.

their condition in cold weather. The addition of roughage and 2 to 3 pounds of grain when grazing conditions become difficult will prevent winter weight losses and the attendant risk of mortalities. Calves wintering in pens will not require protein supplement if good quality oat hay or a mixture of alfalfa and grass hay is fed.

Supplementing yearling steers on grass

Yearling steers on summer range, when fed 2 pounds per day of linseed oilcake or brewers' dried grain (20 per cent protein) from mid-July until late October, gain 50 to 75 pounds more than unsupplemented steers. Supplemented steers grade red or blue label if slaughtered at this time. Steers at this age do not winter well on the range without some form of supplement but the need for protein is not so great as in the case of calves and cheaper feeds can be used.

Wintering range ewes

Ewe lambs will require a good growing ration during the winter. If good quality roughage is not available, $\frac{1}{4}$-pound linseed oilcake may be fed to assure adequate protein intake. Mature range ewes receiving $\frac{1}{2}$-pound per day of high-protein supplement at the Manyberries Station from mid-pregnancy until the grasses commenced spring growth have weaned more and heavier lambs as the result of improved nutrition and increased milk flow.

FEEDING PHOSPHORUS SUPPLEMENT

To supply the needed phosphorus, steamed bonemeal may be fed during the fall, winter and spring months in a mixture of 2 pounds salt to 1 pound bonemeal. This will assure against the unthriftiness, reduced fertility, slow growth rate and depraved appetite characteristic of cattle suffering from a deficiency of phosphorus. Growing animals will consume bonemeal throughout the year, although the need is greatest when there is no green grass available.

CRESTED WHEAT GRASS RECOMMENDED FOR RESEEDING

Ways of using crested wheat grass

The value of crested wheat grass for reseeding depleted rangeland and abandoned farmland in the shortgrass and mixed prairie zones is well known. It produces up to three times as much forage as does the native cover in the shortgrass prairie.

FIG. 3—Protein supplements maintain daily gains of cattle on dry ranges.

Use of 4 acres of crested wheat grass per cow for spring grazing will make green grass available 2 to 3 weeks earlier in the spring and allow deferred use of the native grasses until mid-June. This improves the productivity of the native grasses and reduces the need of supplying protein supplement to cattle or breeding ewes on spring range. Crested wheat grass for spring pasture offers a means of preventing losses from the poisonous plant, death camas, during early spring. Crested wheat grass can also be used for sheep grazing during the

period when the needles of speargrass usually penetrate the skin of lambs, causing irritation, loss in gains and necessity of trimming along the underline at slaughter. Low-lying range, where bluejoint is the dominant species, also can be used during this period, when it is accessible. Russian wild rye, another valuable drought-tolerant grass, is palatable and nutritious throughout the summer, and would be useful for this purpose.

Establishing a stand

The Noble blade and one-way disk have both been used successfully for preparing a seed-bed for crested wheat grass planting, where the native grass cover is still intact. Their use will depend upon the stoniness of the land and the topography. Preparation of a seed-bed is not necessary on stubbleland or on abandoned farmland in the annual-weed stage. Seeding in the late fall with seed drill in rows 12 inches apart and at a rate of approximately 6 pounds per acre is recommended. The seed should not be covered to a depth greater than $\frac{1}{2}$ to $\frac{3}{4}$ inch. The seeded area will require protection from grazing for the first year to allow establishment of a vigorous stand.

FIELD CORN FOR FALL PASTURE

Lambs and calves will continue to make good gains after weaning when they have access to a standing field of corn. Ten acres of irrigated Gehu corn at the Manyberries Station carried 40 calves for a 2-month period after weaning in late October at a gain of 1 pound per day. When dryland Falconer corn was used as a supplement to native prairie at the rate of 3 lambs per acre for a 56-day period, lambs on corn pasture gained 7 pounds more per head than those grazing on native range at the recommended rate. The cured fodder was consumed with relish and very few stalks remained. Few ears were produced.

If corn is grown near the buildings where manure can be applied readily, the land can be used for many years in succession with favourable results. The corn should be sown early in May. Seed may be checked-rowed with the corn planter at the rate of 6 to 8 pounds per acre in hills 36 to 42 inches apart, or with the grain drill at the rate of 15 to 20 pounds per acre in rows 36 to 42 inches apart.

RANGE IMPROVEMENTS INCREASE CARRYING CAPACITY

The use of crested wheat grass plantings for early spring pasture represents a range improvement that will increase carrying capacity. The yield of small pastures near the buildings can be increased appreciably by the application of barnyard manure at intervals of about 10 years. The best results are obtained on light upland soils.

In addition to the above, there are certain range improvements which do not affect the grass cover directly, yet which have an important bearing on the number of animal units that a ranch can carry.

Use of runoff water

Irrigation development for winter feed production and the establishment of stock-watering reservoirs on the range will help to stabilize a ranch enterprise and increase the number of animals which can safely be carried on a year-round basis. When cattle have to travel more than $1\frac{1}{2}$ miles to water there is a tendency to overgraze the area around the watering places and undergraze the more distant parts of the range.

In building stock-watering dams it is more important to have good depth (at least 10 feet) than to have a large surface area of water because of the high evaporation rate in the shortgrass praire zone.

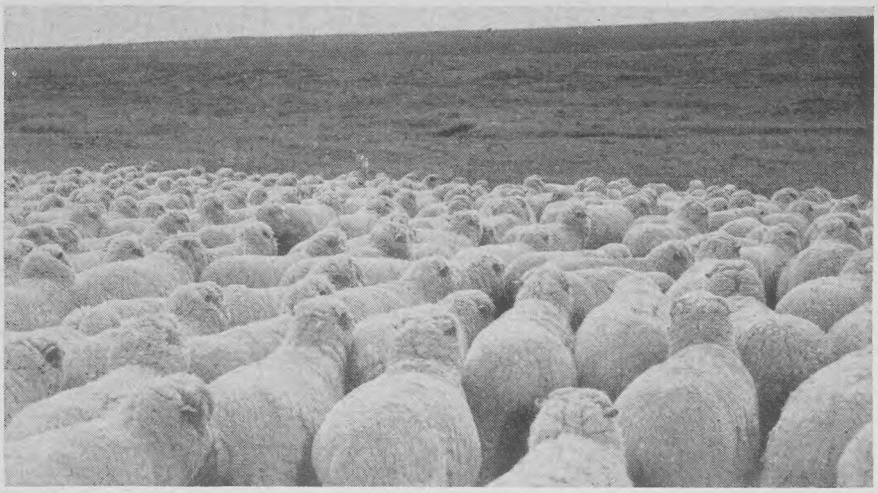

FIG. 4—Ewes receiving protein supplement in late pregnancy produce thrifty lamb crops.

Use of dykes to spread the overflow from stock-watering dams into the land below can increase the forage production on that land from 200 to 1600 per cent and provide a spot where green grass will be available during the mid-summer period. On light soils, sandgrass may in some instances increase at the expense of more nutritious species.

Control prairie fires

The usefulness of elevated grades across the range, particularly on large holdings, has not been generally appreciated. They make it easier and less costly to move feed and supplies to various parts of the range. Moreover, they make very good fire-guards. Studies have shown that burning of range pastures causes reduction in forage yield the following year and that from 3 to 5 years are required for complete recovery under conditions of moderate grazing.

Fencing of rangeland

The judicious fencing of rangeland to include the best sheltered areas in winter fields is important in planning a ranch layout. Shelter is also needed on spring range during the calving season, as a late storm will occasionally cause losses on open range.

Fencing for rotational grazing, where alternate fields are used for spring, summer, and fall grazing in succeeding years, has not proved beneficial to the gains of grazing animals. Rather, moderate continuous grazing appears to be the most practical method of pasture use. There will in practice be a form of rotational grazing, where crested wheat grass is used for spring grazing, less sheltered areas of native range in the summer and fall, and the rougher land with brush and coulees during the winter.

The need for fences to ensure the utilization of certain range areas and the distribution of bulls during the breeding season is not so acute in the shortgrass prairie as it is in areas of rough topography.

In construction of fences, the importance of treating posts to prolong their life is an established principle of good range management. The coal tar or creosote treatment for split cedars and the bluestone treatment for green poplar posts have given satisfactory results.

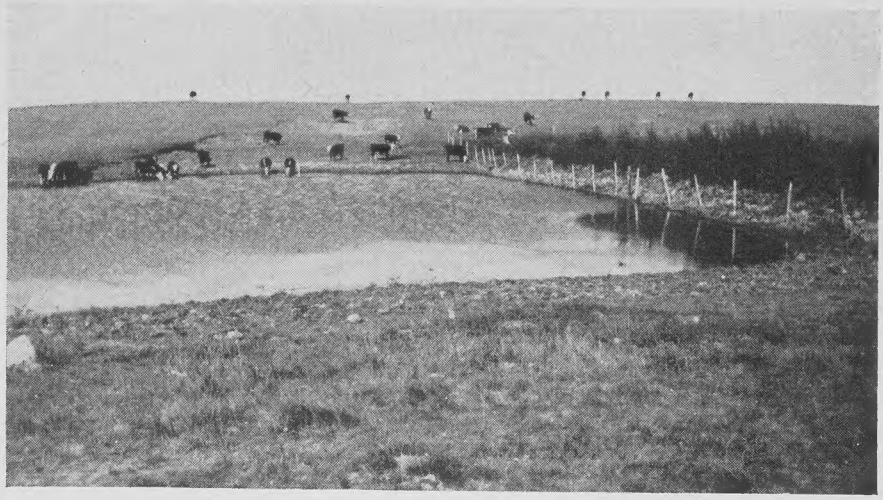

FIG. 5—Well-spaced reservoirs are a definite asset on shortgrass rangeland. Fencing protects the fill until crested wheat grass cover and willow riprap become established.

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